FORM PTO-1390
REV. 5-93

US DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEYS DOCKET NUMBER
P00,1879

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)
09/719766

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE99/01721	**11JUNE 1999**	**17 JUNE 1998**

TITLE OF INVENTION
METHOD AND DEVICE FOR WIRELESS DATA TRANSMISSION OF DATA ACCORDING TO AN FSK METHOD, ESPECIALLY A GFSK METHOD

APPLICANT(S) FOR DO/EO/US **HENRIK WAGENER**

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ☒ A copy of International Application as filed (35 U.S.C. 371(c)(2)) - drawings attached.
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2) - drawings attached.

7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.

8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; **(PTO 1449, Prior Art, Search Report, 10 References).**

12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included. **(SEE ATTACHED ENVELOPE)**

13. ☒ Amendment "A" Prior to Action.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.

14. ☒ A substitute specification and substitute specification mark-up.

15. ☒ A change of address letter attached to the Declaration.

16. ☒ Other items or information:
    a. ☒ Request for Approval of Drawing Modifications, 1 sheet of drawings, Figure 1.

    b. ☒ Appointment of Associate Power of Attorney

    c. ☒ EXPRESS MAIL #EL655299245US dated December 15, 2000.

U.S. APPLICATION NO (if known, see 37 C.F.R. 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/719766	PCT/DE99/01721	P00,1879

17. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5): Search Report has been prepared by the EPO or JPO . . . . . $860.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) . . $690.00 No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2) . . . . . $710.00 Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2) paid to USPTO . . . . . $1000.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) . . . . . $ 100.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00	
Surcharge of $130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e)).	$	

Claims	Number Filed		Number Extra	Rate		
Total Claims	16	- 20 =	0	X $ 18.00	$	
Independent Claims	02	- 3 =	0	X $ 80.00	$	
Multiple Dependent Claims				$270.00+	$	
				TOTAL OF ABOVE CALCULATIONS =	$ 860.00	
Reduction by ½ for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)					$	
				SUBTOTAL =	$ 860.00	
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +					$	
				TOTAL NATIONAL FEE =	$ 860.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). $40.00 per property +						
				TOTAL FEES ENCLOSED =	$ 860.00	
				Amount to be refunded	$	
				charged	$	

a. ☒ A check in the amount of $ 860.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **50-1519**. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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BOX PCT
IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY--CHAPTER II

APPLICANT(S):	HENRIK WAGENER
ATTORNEY DOCKET NO.:	P00,1879
INTERNATIONAL APPLICATION NO:	PCT/DE99/01721
INTERNATIONAL FILING DATE:	11 JUNE 1999
INVENTION:	METHOD AND DEVICE FOR WIRELESS DATA TRANSMISSION OF DATA ACCORDING TO AN FSK METHOD, ESPECIALLY A GFSK METHOD

Assistant Commissioner for Patents,
Washington D.C. 20231

AMENDMENT A PRIOR TO ACTION

Sir:

Applicants herewith amend the above-referenced PCT application, and request entry of the Amendment prior to examination on the United States Examination Phase.

IN THE CLAIMS:

On page 9:

replace line 1 with --WHAT IS CLAIMED IS:--;

Please replace original claims 1-16 with the following rewritten claims 1-16, referring to the mark-ups in Appendix A.

1. (Amended) A method for wirelessly transmitting data according to an FSK method, comprising the following steps:

receiving data;

measuring an error rate of said received data;

evaluating said error rate and a field intensity, producing an evaluation result; and

2. (Amended) The method according to claim 1, wherein said frequency swing is modified within a preadjusted range.

3. (Amended) The method according to claim 1, further comprising the step of basing said optimized transmission behavior on a table reproducing an obtainable range of said transmission dependent on said adjusted frequency swing.

4. (Amended) The method according to claim 3, further comprising the step of optimizing said frequency swing toward a maximal range based on said table when said evaluation result is a low field intensity and a low error rate at the same time.

5. (Amended) The method according to claim 1, further comprising the step of basing said optimized transmission behavior on a second table reproducing an obtainable interference immunity of said transmission dependent on said adjusted frequency swing.

6. (Amended) The method according to claim 5, further comprising the step of optimizing said frequency swing toward a maximal interference immunity based on said second table when said evaluation result is a high field intensity and a high error rate at the same time.

7. (Amended) The method according to claim 1, wherein said transmission ensues according to the DECT standard.

8. (Amended) The method according to claim 1, further comprising the step of selecting an optimal frequency swing lower for a maximal range than the frequency swing for a maximal interference immunity.

9. (Amended) A device for wirelessly transmitting data according to an FSK method, comprising:

a receiver for receiving data;

a first measuring device for measuring an error rate of said received data;

a second measuring device for measuring a field intensity during said reception of data;

an evaluation unit for evaluating said measured error rate and said measured field intensity;

a control unit for adjusting a frequency swing of the FSK method, which is utilized for wirelessly transmitting data by a transmitter dependent on said measured error rate and said measured field intensity in order optimize transmission behavior.

10. (Amended) The device according to claim 9, wherein said frequency swing can be modified within a preadjusted range.

11. (Amended) The device according to claim 9, wherein said evaluation unit further comprises a first table reproducing an obtainable range of a transmission dependent on said adjusted frequency swing for purposes of optimizing transmission behavior.

12. (Amended) The device according to claim 11, wherein said frequency swing is optimized toward a maximal range on the basis of said first table when said evaluation unit detects a low field intensity and a low error rate at the same time.

13. (Amended) The device according to claim 9, wherein said evaluation unit further comprises a second table reproducing an obtainable interference immunity of a transmission dependent on said adjusted frequency swing for purposes of optimizing transmission behavior.

14. (Amended) The device according to claim 13, wherein said frequency swing is optimized toward a maximal interference immunity on the basis of said

second table when said evaluation unit detects a high field intensity and a high error rate at the same time.

15. (Amended) The device according to claim 9, wherein an optimal frequency swing is selected lower for a maximal range than a frequency swing for a maximal interference immunity.

16. (Amended) The device according to claim 9, wherein said device is designed for a transmission according to the DECT standard.

REMARKS

The present Amendment revises the specification and claims to conform to United States patent practice, before examination of the present PCT application in the United States National Examination Phase. Pursuant to 37 CFR 1.125 (b), applicants have concurrently submitted a substitute specification, excluding the claims, and provided a marked-up copy. All of the changes are editorial and applicant believes no new matter is added thereby. The amendment of claims 1-16 is not intended to be a surrender of any of the subject matter of those claims.

Early examination on the merits is respectfully requested.

Submitted by,

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Appendix A
Mark Ups for Claim Amendments

This redlined draft, generated by CompareRite (TM) - The Instant Redliner, shows the differences between -
original document : Q:\DOCUMENTS\YEAR 2000\P001879-WAGNER-FSK WIRELESS DATA XMISSION\ORIGINAL CLAIMS.DOC
and revised document: Q:\DOCUMENTS\YEAR 2000\P001879-WAGNER-FSK WIRELESS DATA XMISSION\CLEAN AMENDED CLAIMS.DOC

CompareRite found 108 change(s) in the text

Deletions appear as Overstrike text surrounded by []
Additions appear as Bold-Underline text

1. [~~Method~~]**(Amended) A method** for wirelessly transmitting data according to an FSK method, [

]comprising the following steps:

[-]receiving [~~(1, 3)~~] data;[,

-]

measuring [~~(6) the~~] **an** error rate of [~~the~~] **said** received data;[,

-]

evaluating [~~(6) the~~] **said** error rate and [~~the~~] **a** field intensity, **producing an evaluation result; and**[-]

adjusting [~~(5, 6, 10) the~~] **a** frequency swing of [~~the~~] **said** FSK method, which is utilized for wirelessly transmitting [~~(15)~~] data dependent on [~~the~~] **said** evaluation [~~(12)~~] of [~~the~~] **said** error rate and [~~the~~] **said** field intensity in order to optimize [~~(13) the~~] transmission behavior.

2. [~~Method~~]**(Amended) The method** according to claim 1, **wherein said** [~~characterizedinthat~~

~~the~~] frequency swing is modified within a preadjusted range.

3. **(Amended) The method according to claim 1, further comprising the step of basing said optimized transmission behavior on a table reproducing an** [~~Method according to one of the previous claims,~~

~~characterizedinthat~~

~~the transmission behavior is optimized on the basis of a table (12) reproducing the~~] obtainable range of [~~the~~] **said** transmission [~~(15)~~] dependent on [~~the~~] **said** adjusted frequency swing.

4. [~~Method~~]**(Amended) The method** according to claim 3, **further comprising the step of optimizing said** [~~characterizedinthat~~

~~the~~] frequency swing [~~is optimized (13)~~] toward a maximal range [~~on the basis of the~~] **based on said** table [~~(12)~~] when [~~the~~] **said** evaluation [~~(6)~~] result is a low [~~frequency~~] **field** intensity and a low [~~frequency~~] **error** rate at the same time.

5. **(Amended) The method according to claim 1, further comprising the step of basing said optimized** [~~Method according to one of the previous claims,~~

~~characterizedinthat~~

~~the~~] transmission behavior [~~is optimized on the basis of~~] **on** a second table [~~(14)~~] reproducing [~~the~~] **an** obtainable interference immunity of [~~the~~] **said** transmission [~~(15)~~] dependent on [~~the~~] **said** adjusted frequency swing.

6. [~~Method~~]**(Amended) The method** according to claim 5, **further comprising the step of optimizing said** [~~characterizedinthat~~

~~the~~] frequency swing [~~is optimized (13)~~] toward a maximal interference immunity [~~on the basis of the~~] **based on said** second table [~~(14)~~] when [~~the~~] **said** evaluation [~~(6)~~] result is a high field intensity and a high error rate at the same time.

7. **(Amended) The method according to claim 1, wherein said transmission** [~~Method according to one of the previous claims,~~

~~characterizedinthat~~

~~the transmission (15)~~] ensues according to the DECT standard.

8. **(Amended) The method according to claim 1, further comprising the step of selecting an** [~~Method according to one of the previous claims,~~

~~characterizedinthat~~

~~the~~] optimal frequency swing ~~[is selected]~~ lower for a maximal range than the frequency swing for a maximal interference immunity.

9. ~~[Device]~~**(Amended) A device** for wirelessly transmitting data according to an FSK method, ~~[~~

~~]~~comprising:

~~[-]~~a receiver ~~[(3),]~~ **for receiving data;**

~~[- a]~~**a first** measuring device ~~[(6)]~~ for ~~[the]~~ **measuring an** error rate of **said** received data~~;[,~~

~~-]~~

a second measuring device ~~[(3)]~~ for ~~[the]~~ **measuring a** field intensity ~~[(8)]~~ during ~~[the]~~ **said** reception of ~~[the]~~ data~~;[,~~

~~-]~~

an evaluation unit ~~[(6)]~~ for ~~[the]~~ **evaluating said** measured error rate ~~[an]~~ and ~~[the]~~ **said** measured field intensity~~;[,~~

~~-]~~

a control unit ~~[(13)]~~ for adjusting ~~[the]~~ **a** frequency swing of the FSK method, which is utilized for wirelessly transmitting ~~[(15)]~~ data by a transmitter ~~[(5)]~~ dependent on ~~[the]~~ **said** measured error rate and ~~[the]~~ **said** measured field intensity in order optimize ~~[the]~~ transmission behavior.

10. ~~[Device]~~**(Amended) The device** according to claim 9, **wherein said** ~~[characterizedinthat~~

~~the]~~ frequency swing can be modified within a preadjusted range.

11. **(Amended) The device according to claim 9, wherein said evaluation unit further comprises a first table reproducing an** ~~[Device according to one of the claims 9 or 10,~~

~~characterizedinthat~~

~~the evaluation unit (6) contains a table (12) reproducing the~~] obtainable range of [~~the~~] **a** transmission [~~(15)~~] dependent on [~~the~~] **said** adjusted frequency swing for purposes of optimizing [~~the~~] transmission behavior.

12. [~~Device~~]**(Amended) The device** according to claim 11, **wherein said**[~~= characterizedinthat~~

~~the~~] frequency swing is optimized [~~(13)~~] toward a maximal range on the basis of [~~the~~] **said first** table [~~(12)~~] when [~~the~~] **said** evaluation unit [~~(6)~~] detects a low field intensity and a low error rate at the same time.

13. **(Amended) The device according to claim 9, wherein said evaluation unit further comprises a second table reproducing an** [~~Device according to one of the claims 9 through 12,~~

~~characterizedinthat~~

~~the evaluation unit (6) contains a second table (14) reproducing the~~] obtainable interference immunity of [~~the~~] **a** transmission [~~(15)~~] dependent on [~~the~~] **said** adjusted frequency swing for purposes of optimizing [~~the~~] transmission behavior.

14. [~~Device~~]**(Amended) The device** according to claim 13, **wherein said** [~~characterizedinthat~~

~~the~~] frequency swing is optimized [~~(13)~~] toward a maximal interference immunity on the basis of [~~the secon [sic]~~] **said second** table [~~(14)~~] when [~~the~~] **said** evaluation unit [~~(6)~~] detects a high field intensity and a high error rate at the same time.

15. **(Amended) The device according to claim 9, wherein an** [~~Device according to one of the claims 9 through 14,~~

~~characterizedinthat~~

~~the~~] optimal frequency swing is selected lower for a maximal range than [~~the~~] **a** frequency swing for a maximal interference immunity.

16. **(Amended) The device according to claim 9, wherein said device** ~~[Device according to one of the claims 9 through 15, characterized in that it]~~ is designed for a transmission ~~[(15)]~~ according to the DECT standard.

5

SPECIFICATION

TITLE
METHOD AND DEVICE FOR WIRELESS DATA TRANSMISSION OF DATA ACCORDING TO AN FSK METHOD, ESPECIALLY A GFSK METHOD

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a device and method for the wireless data transmission of data according to an FSK method such as the GFSK method, as it, among other things, is used according to the DECT standard.

Description of the Related Art

According to a DECT standard, data is modulated according to a GFSK (Gaussian Frequency Shift Keying) method. For example, David, Benker, "Digitale Mobilfunksysteme, Taeubner Verlag, Stuttgardt", 1996, ISBN 3-519-06181-3 discloses details of the DECT standard. According to the DECT standard, data is transmitted in a frequency range of 1880 to1900 MHz (in the extended case, up to 1930 MHz) in 120 duplex channels having a channel spacing of 1728 kHz. The TDMA access method uses frames of 10 ms. The TDD method is used as duplex method.

For amplitude keying, the amplitude of a carrier wave is changed by the modulation of the data signals, this carrying the information; the frequency, however, remains constant. For frequency keying (FSK, Frequency Shift Keying) the exact opposite is true, i.e., the information is contained in the frequency. The abrupt changeover from one frequency to another, however, leads to relatively high spectral secondary sidebands, so that a high bandwidth is occupied by the transmission signal. A baseband filtering can improve this behavior. A frequency filter g(t) is used, which does not exhibit a rectangular curve but rather a smoothened curve. The smoothing function can be assumed by a Gaussean low-pass filter, for example, thus resulting in a GFSK modulation being received.

The impulse response h (t) of a Gaussean low-pass filter is:

$$h(t) = \sqrt{\frac{2\pi}{\ln 2}} B \exp\left(-\frac{2\pi^2 B^2}{\ln 2} t^2\right)$$

where B is the 3 dB cutoff frequency. The Gaussean low-pass filter can be switched directly in front of the modulation input of a VCO. Pulses deriving from the convolution of the original rectangular pulses with the impulse response of the Gaussean low-pass filter are then present at the modulation input:

$$g(t) = \frac{1}{2}\left[erf\left(\sqrt{\frac{2}{\ln 2}}\pi B\frac{t+T/2}{T}\right) - erf\left(\sqrt{\frac{2}{\ln 2}}\pi B\frac{t-T/2}{T}\right)\right]$$

Here, erf(x) is the Gaussean error function:

$$erf(x) = \frac{2}{\sqrt{\pi}}\int_0^x e^{-u^2} du$$

The GFSK transmission filter can be unambiguously marked by its modulation index ("BT relationship"). Figure 6 shows the impulse response of the transmission filter for different modulation indices (BT). It can be seen that the impulse response becomes broader for modulation indices becoming smaller, so that a "partial response" behavior occurs.

For the application in DECT devices, the modulation method GFSK has been specified with a nominal modulation index (BT) of 0.5, which corresponds to a frequency swing of 288 kHz. A range of 202 kHz through 403 kHz is allowable with respect to the frequency swing when the modulation index is fixed.

According to the prior art, the frequency swing is set to a fixed value—thus, an adaptation is not possible.

SUMMARY OF THE INVENTION

Therefore, the present invention is based on the object of creating a possibility for creating the adaptation of a wireless transmission of data according to an FSK method to different environmental scenarios. The present invention, can be applied with respect to all FSK methods and their derivatives.

According to the invention, the frequency swing of an FSK method, for example of the GFSK method, is modified dependent on different parameters.

According to the invention, a method for wirelessly transmitting data according to an FSK method is provided. In this method, data are received and the error rate (BER, Bit Error Rate) of the received data is measured. The field intensity (RSSI value) of the received data is measured at the same time. The error rate and the field intensity are evaluated. Depending on the evaluation of the error rate and the field intensity, the frequency swing of the FSK method used for wirelessly transmitting data is adjusted in order to optimize the transmission behavior.

The frequency swing can be modified within a preadjusted range. The transmission behavior can be optimized on the basis of a table reproducing the obtainable transmission range dependent on the adjusted frequency swing. If the evaluation result is a low field intensity and a low error rate at the same time, the frequency swing, on the basis of the cited table, can be optimized with respect to a maximal range. The transmission behavior can be optimized on the basis of a second table, which reproduces the obtainable interference immunity of the transmission dependent on the adjusted frequency swing. If the evaluation result is a high field intensity and a high error rate at the same time, the frequency swing can be optimized with respect to a maximal interference immunity on the basis of the second table. The transmission can ensue according to the DECT standard. The optimal frequency swing can be selected lower for a maximal range than the frequency swing for a maximal interference immunity.

According to the present invention, a device for wirelessly transmitting data according to an FSK method - as it is used according to the DECT standard, for example - is also provided. The device comprises a receiver and a first measuring device for the error rate (BER, Bit Error Rate) of the received data. Furthermore, a second measuring device is provided for the field intensity during the reception of the data. An evaluation unit processes the measured error rate and the measured field intensity. A control unit is also provided in order to adjust the frequency swing of the FSK method, which is used for the wireless transmission of data by a transmitter, dependent on the measured error rate and the measured field intensity for purposes of optimizing the transmission behavior.

Further features and advantages of the present invention are explained by way of example in greater detail on the basis of an exemplary embodiment and with reference to the appertaining figures.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram illustrating the structure of an inventive device for wirelessly transmitting data according to an FSK method;

Figure 2 is a logarithmic graph illustrating the bit error rate dependent on the signal-to-noise ratio (SNR) according to a simulation;

Figure 3 is a logarithmic graph illustrating the bit error rate of a wireless transmission dependent on the signal-to-noise ratio for a frequency swing of the disturb signal of 340 kHz,

Figure 4 is a logarithmic graph illustrating the bit error rate dependent on the signal-to-noise ratio for a frequency swing of the disturb signal of 288 kHz,

Figures 5a-d are spectral frequency graphs illustrating the different spectrums of GFSK signals, which have been used for the measuring according to the figures 2 through 4; and

Figure 6 is a response graph illustrating the impulse response g (t) of a GFSK filter.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is generally applied with respect to FSK methods and is described on the basis of an exemplary GFSK method.

The present invention utilizes the phenomenon that a different system behavior of a wireless transmission - dependent on the adjusted modulation index (BT value) of an FSK method (for example, of the GFSK method) - results with respect to the tangential signal sensitivity (range) or the resistance to jamming, for example. If an optimally large range is desired for the transmission, the frequency swing selected therefore inventively differs from the frequency swing of a system that is optimized with respect to maximal resistance to jamming. Thus, according to the present invention, the system is adapted to different scenarios by a corresponding adjustment of the frequency swing (corresponding to a

modulation index) after the bit error rate (BER, Bit Error Rate) and the corresponding RSSI (Radio Signal Strength Indicator, reception field intensity) value have been evaluated.

As shown in Figure 1, digitally modulated signals can be received by an antenna 1 and can be forwarded to a receiver 3. The receiver 3 forwards the received data (RX data) 7, on one hand, and the RSSI value 8, on the other hand, to an evaluation unit 6. More precisely, the receiver 3 forwards the received data 7 and the RSSI value 8 to a control unit 13 in the evaluation unit.

In addition to the control unit 13, the evaluation unit 6 comprises a first table 12 and a second table 14, which are respectively connected to the control unit 13. On one hand, the control unit 13 in the evaluation unit 6 drives a local oscillator (synthesizer) 4 via a control channel 9, which is connected to the receiver 3 and to a transmitter 5 of the mobile radio device 16. On the other hand, the control unit 13 of the evaluation unit 6 drives the frequency swing 10, which is utilized by the transmitter 5. The evaluation unit 6 forwards the data 11 to be transmitted to the transmitter 5, which modulates these data (TX data) 11, with the frequency swing 10 prescribed by the control unit 13, onto the frequency of the local oscillator (synthesizer) 4 and which then forwards them to an antenna 2 for purposes of sending them via a wireless transmission path 15.

The reception data 7 and the RSSI value 8 therefore are transmitted to the control unit 13 in the evaluation unit 6 by the receiver 3. The bit error rate of the received data 7 and the reception field intensity (RSSI value) measured by the receiver 3, by the respective first measuring device 17 and the second measuring device 18, are evaluated in the control unit 13, resulting in the following different scenario:

Case a)

No or little influence by disturbing signals:

The received data 7 have low bit error rates given a low reception field intensity at the same time. In this case, the control unit 13 can drive the frequency swing of the transmitter 5 with respect to a maximal range.

Case b)

Interferences as a result of other signals such as DECT signals:
In this case, the bit error rates are relatively high given relatively high reception field intensities. In this case, the control unit 13 of the evaluation unit 6 controls the frequency swing of the transmitter 5 with respect to maximal interference immunity.

The first table 12 and the second table 14 are provided in the evaluation unit 6 for optimizing the system with respect to a maximal range or a maximal interference immunity. The first table 12 indicates the maximally obtainable range of the wireless transmission dependent on the frequency swing that can be selected within an allowed range. The second table 14 represents the maximal interference immunity dependent on the frequency swing.

The tables 12 and 14 are prepared, for example, prior to the actual transmission, by an analysis of the system behavior of the wireless transmission 15 by simulations with different frequency swings. In Figure 2, the bit error rate has been calculated dependent on the signal-to-noise ratio. The curves entered in Figure 2 represent the following cutoff data: 1) Frequency swing of 202 kHz: Lower limit of the allowed standard, 2) Frequency swing of 288 kHz: Nominal value, 3) Frequency swing of 340 kHz: Frequency swing as it is firmly adjusted in some devices according to the prior art, and 4) Frequency swing of 403 kHz: Upper allowed limit of the DECT standard.

It can be concluded, by evaluating the diagram shown in Figure 2, that a frequency swing of 340 kHz is to be adjusted for a system that is optimized with respect to maximal range; this corresponds to the above-cited case a).

The characterizations of the resistance to jamming of a DECT connection (case b)) derive from further simulations. According to the calculations shown in the Figures 3 and 4, it can be seen that the coexistence of different systems should be continued to be viewed in this scenario. For a disturbing signal having a 340 kHz frequency swing (e.g., neighboring traditional DECT systems), the optimal frequency, as it should be utilized with respect to the present invention - is also at 340 kHz (see Figure 3). According to the present invention, the nominal frequency swing of 288 kHz is adjusted for co-channel interferences with respect to all systems (Figure 4).

Figures 5a through 5d show the test signals utilized during the simulations.

According to the present invention, an adaptation of the system to different scenarios can be undertaken by evaluating the bit error rate and the corresponding RSSI value by a corresponding adjustment of the frequency swing of an FSK transmission.

The above-described method and device are illustrative of the principles of the present invention. Numerous modifications and adaptations thereof will be readily apparent to those skilled in this art without departing from the spirit and scope of the present invention.

ABSTRACT

According to the present invention, a mobile radio device is provided for wirelessly transmitting data according to a GFSK method, as performed, for example, with DECT devices. The device comprises a receiver (3), a first measuring device (17) for the error rate of received data and a second measuring device (18) for the field intensity (8) during the reception of data. An evaluation unit (6) processes the measured error rate and the measured field intensity. Depending on the measured error rate and the measured field intensity, a control unit (13) adjusts the frequency swing of the GFSK method, which is utilized for wirelessly transmitting (15) the data by a transmitter (5) in the mobile radio device (16), for purposes of optimizing the transmission behavior. In order to optimize the transmission behavior, the evaluation unit (6) contains a first table (12) and a second table (14) reproducing the obtainable range or the obtainable interference immunity of the transmission (15) dependent on the selected frequency swing.

METHOD AND DEVICE FOR WIRELESS DATA TRANSMISSION OF DATA ACCORDING TO AN FSK METHOD, ESPECIALLY A GFSK METHOD

The present invention relates to a device and method for the wireless data transmission of data according to an FSK method such as the GFSK method, as it, among other things, is used according to the DECT standard.

According to a DECT standard, data is modulated according to a GFSK (Gaussian Frequency Shift Keying) method. For example, David, Benker, "Digitale Mobilfunksysteme, Taeubner Verlag, Stuttgardt, 1996, ISBN 3-519-06181-3 can be cited as references concerning details of the DECT standard. According to the DECT standard, data is transmitted in a frequency range of 1880 to1900 MHz (in the extended case up to 1930 MHz) in 120 duplex channels. The channel spacing thereby is 1728 kHz. The TDMA access method having frames of 10 ms is used. The TDD method is used as duplex method.

The present invention can be applied with respect to all FSK methods and their derivatives.

While the amplitude of a carrier wave is changed by the modulation of the data signals during the amplitude keying, and the frequency, however, remains constant, the frequency keying (FSK, Frequency Shift Keying) is the exact opposite, i.e., the information is contained in the frequency. The abrupt changeover from one frequency to another, however, leads to relatively high spectral secondary sidebands, so that a high bandwidth is occupied by the transmission signal. A baseband filtering can improve this behavior. A frequency filter g(t) is used, which does not exhibit a rectangular curve but rather a smoothened curve. The smoothing function can be assumed by a Gaussean low-pass filter, for example. A GFSK modulation is thus received.

The impulse response h (t) of a Gaussean low-pass filter is:

$$h(t) = \sqrt{\frac{2\pi}{\ln 2}} B \exp\left(-\frac{2\pi^2 B^2}{\ln 2} t^2\right)$$

whereby B is the 3 dB cutoff frequency. The Gaussean low-pass filter can be switched directly in front of the modulation input of a VCO. Pulses deriving from the convolution of the original rectangular pulses with the impulse response of the Gaussean low-pass filter are then present at the modulation input:

$$g(t) = \frac{1}{2}\left[erf\left(\sqrt{\frac{2}{\ln 2}}\pi B \frac{t + T/2}{T}\right) - erf\left(\sqrt{\frac{2}{\ln 2}}\pi B \frac{t - T/2}{T}\right)\right]$$

Hereby, erf(x) is the Gaussean error function:

$$erf(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-u^2} du$$

The GFSK transmission filter can be unambiguously marked by its modulation index ("BT relationship"). Figure 6 shows the impulse response of the transmission filter for different modulation indices (BT). It can be seen that the impulse response becomes broader for modulation indices becoming smaller, so that a "partial response" behavior occurs.

For the application in DECT devices, the modulation method GFSK has been specified with a nominal modulation index (BT) of 0.5, whereby this corresponds to a frequency swing of 288 kHz. A range of 202 kHz through 403 kHz is allowable with respect to the frequency swing given the fixing of the modulation index.

According to the prior art, the frequency swing is set to a fixed value, an adaptation therefore is not possible.

Therefore, the present invention is based on the object of creating a possibility for creating the adaptation of a wireless transmission of data according to an FSK method to different environmental scenarios.

According to the idea of the invention, the frequency swing of an FSK method, for example of the GSK method, is modified dependent on different parameters.

To be more precise, the aforementioned object is achieved by the features of claims 1 and 9. The subclaims form the inventive idea in a particularly advantageous way.

According to the invention, a method for wirelessly transmitting data according to an FSK method is provided. Data are thereby received and the error rate (BER, Bit Error Rate) of the received data is measured. The field intensity (RSSI value) of the received data is measured at the same time. The error rate and the field intensity are evaluated. Depending on the evaluation of the error rate and the field intensity, the frequency swing of the FSK method used for wirelessly transmitting data is adjusted in order to optimize the transmission behavior.

The frequency swing can thereby be modified within a preadjusted range.

The transmission behavior can be optimized on the basis of a table reproducing the obtainable transmission range dependent on the adjusted frequency swing.

If the evaluation result is a low field intensity and a low error rate at the same time, the frequency swing, on the basis of the cited table, can be optimized with respect to a maximal range.

The transmission behavior can be optimized on the basis of a second table, which reproduces the obtainable interference immunity of the transmission dependent on the adjusted frequency swing.

If the evaluation result is a high field intensity and a high error rate at the same time, the frequency swing can be optimized with respect to a maximal interference immunity on the basis of the cited second table.

The transmission can ensue according to the DECT standard.

The optimal frequency swing can be selected lower for a maximal range than the frequency swing for a maximal interference immunity.

According to the present invention, a device for wirelessly transmitting data according to an FSK method - as it is used according to the DECT standard, for example - is also provided. The device comprises a receiver and a first measuring device for the error rate (BER, Bit Error Rate) of the received data. Furthermore, a second measuring device is provided for the field intensity during the reception of the data. An evaluation unit processes the measured error rate and the measured field intensity. A control unit is also provided in order to adjust the frequency swing of the FSK method, which is used for the wireless transmission of data by a transmitter, dependent on the measured error rate and the measured field intensity for purposes of optimizing the transmission behavior.

Further features and advantages of the present invention are exemplary explained in greater detail on the basis of an exemplary embodiment and with reference to the appertaining figures; shown are:

Figure 1 the structure of an inventive device for wirelessly transmitting data according to an FSK method,

Figure 2 the bit error rate dependent on the signal-to-noise ratio (SNR) according to a simulation.

Figure 3 the bit error rate of a wireless transmission dependent on the signal-to-noise ratio for a frequency swing of the disturb signal of 340 kHz,

Figure 4 the bit error rate dependent on the signal-to-noise ratio for a frequency swing of the disturb signal of 288 kHz,

Figure 5a - 5d the different spectrums of GFSK signals, which have been used for the measuring according to the figures 2 through 4, and

Figure 6 the impulse response g (t) of a GFSK filter.

The present invention is generally applied with respect to FSK methods and is described on the basis of a GFSK method, for example.

According to the present invention, the phenomenon that a different system behavior of the wireless transmission - dependent on the adjusted modulation index (BT value) of an FSK method, for example of the GFSK method - results with respect to the tangential signal sensitivity (range) or the resistance to jamming, for example, is utilized. If an optimally large range is desired for the transmission, the frequency swing to be selected therefor inventively differs from the frequency swing of a system that is optimized with respect to maximal resistance to jamming. According to the present invention, an adaptation of the system to different scenarios therefore is undertaken by a corresponding adjustment of the frequency swing (corresponding to a modulation index) after the bit error rate (BER, Bit Error Rate) and the corresponding RSSI (Radio Signal Strength Indicator, reception field intensity) value have been evaluated.

As shown in Figure 1, digitally modulated signals can be received by an antenna 1 and can be forwarded to a receiver 3. The receiver 3 forwards the received data (RX data) 7, on one hand, and the RSSI value 8, on the other hand, to an evaluation unit 6. In order to be more

precise, the receiver 3 forwards the received data 7 and the RSSI value 8 to a control unit 13 in the evaluation unit.

In addition to the control unit 13, the evaluation unit 6 comprises a first table 12 and a second table 14, which are respectively connected to the control unit 13. On one hand, the control unit 13 in the evaluation unit 6 drives a local oscillator (synthesizer), which is connected to the receiver 3 and to a transmitter 5 of the mobile radio device 16. On the other hand, the control unit 13 of the evaluation unit 6 d rives the frequency swing 10, which is utilized by the transmitter 5. The evaluation unit 6 forwards data 11 to be transmitted to the transmitter 5, which modulates these data (TX data) 11, with the frequency swing 10 prescribed by the control unit 13, onto the frequency of the local oscillator (synthesizer) 4 and which then forwards them to an antenna 2 for purposes of sending them via a wireless transmission path 15.

The reception data 7 and the RSSI value 8 therefore are transmitted to the control unit 13 in the evaluation unit 6 by the receiver 3. The bit error rate of the received data 7 and the reception field intensity (RSSI value) measured by the receiver 3 are evaluated in the control unit 13, so that there are the following different scenario:

Case a)

No or little influence by disturb signals:

The received data 7 have low bit error rates given a low reception field intensity at the same time. In this case, the control unit 13 can drive the frequency swing of the transmitter 5 with respect to a maximal range.

Case b)

Interferences as a result of other signals such as DECT signals:

In this case, the bit error rates are relatively high given relatively high reception field intensities. In this case, the control unit 13 of the evaluation unit 6 controls

[sic] the frequency swing of the transmitter 5 with respect to maximal interference immunity.

The first table 12 and the second table 14 are provided in the evaluation unit 6 for optimizing the system with respect to a maximal range or, respectively, a maximal interference immunity. The first table 12 indicates the maximally obtainable range of the wireless transmission dependent on th [sic] frequency swing that can be selected within an allowed range. The second table 14 represents the maximal interference immunity dependent on the frequency swing.

The tables 12 and 14 are prepared, for example prior to the actual transmission, by an analysis of the system behavior of the wireless transmission 15 by simulations with different frequency swings. In Figure 2, the bit error rate has been calculated dependent on the signal-to-noise ratio. The curves entered in Figure 2 represent the following cutoff data:

Frequency swing of 202 kHz: Lower limit of the allowed standard,

Frequency swing of 288 kHz: Nominal value,

Frequency swing of 340 kHz: Frequency swing as it is firmly adjusted in some devices according to the prior art,

Frequency swing of 403 kHz: Upper allowed limit of the DECT standard.

It can be concluded, by evaluating the diagram shown in Figure 2, that a frequency swing of 340 kHz is to be adjusted given a system that is optimized with respect to maximal range; this corresponds to the above-cited case a).

The characterizations of the resistance to jamming of a DECT connection (case b)) derive from further simulations. According to the calculations shown in the Figures 3 and 4, it can be seen that the coexistence of different systems is to be continued to be viewed in this scenario. Given a disturb signal having a 340 kHz frequency swing (e.g. neighboring traditional DECT systems), the optimal frequency, as it is to be utilized with respect to the present invention - is also at 340 kHz (see Figure 3). According to the present invention, the nominal frequency swing of 288 kHz is adjusted given co-channel interferences with respect to all systems (Figure 4).

Figure 5a through 5d show the test signals utilized during the simulations.

According to the present invention, an adaptation of the system to different scenarios can be undertaken by evaluating the bit error rate and the corresponding RSSI value by a corresponding adjustment of the frequency swing of an FSK transmission.

Patent claims

1. Method for wirelessly transmitting data according to an FSK method, comprising the following steps:

- receiving (1, 3) data,
- measuring (6) the error rate of the received data,
- evaluating (6) the error rate and the field intensity,
- adjusting (5, 6, 10) the frequency swing of the FSK method, which is utilized for wirelessly transmitting (15) data dependent on the evaluation (12) of the error rate and the field intensity in order to optimize (13) the transmission behavior.

2. Method according to claim 1,
characterized in that
the frequency swing is modified within a preadjusted range.

3. Method according to one of the previous claims,
characterized in that
the transmission behavior is optimized on the basis of a table (12) reproducing the obtainable range of the transmission (15) dependent on the adjusted frequency swing.

4. Method according to claim 3,
characterized in that
the frequency swing is optimized (13) toward a maximal range on the basis of the table (12) when the evaluation (6) result is a low frequency intensity and a low frequency rate at the same time.

5. Method according to one of the previous claims,
characterized in that

the transmission behavior is optimized on the basis of a second table (14) reproducing the obtainable interference immunity of the transmission (15) dependent on the adjusted frequency swing.

6. Method according to claim 5,
characterized in that
the frequency swing is optimized (13) toward a maximal interference immunity on the basis of the second table (14) when the evaluation (6) result is a high field intensity and a high error rate at the same time.

7. Method according to one of the previous claims,
characterized in that
the transmission (15) ensues according to the DECT standard.

8. Method according to one of the previous claims,
characterized in that
the optimal frequency swing is selected lower for a maximal range than the frequency swing for a maximal interference immunity.

9. Device for wirelessly transmitting data according to an FSK method,
comprising:
- a receiver (3),
- a measuring device (6) for the error rate of received data,
- a second measuring device (3) for the field intensity (8) during the reception of the data,
- an evaluation unit (6) for the measured error rate an and the measured field intensity,
- a control unit (13) for adjusting the frequency swing of the FSK method, which is utilized for wirelessly transmitting (15) data by a transmitter (5) dependent on the

measured error rate and the measured field intensity in order optimize the transmission behavior.

10. Device according to claim 9,
characterized in that
the frequency swing can be modified within a preadjusted range.

11. Device according to one of the claims 9 or 10,
characterized in that
the evaluation unit (6) contains a table (12) reproducing the obtainable range of the transmission (15) dependent on the adjusted frequency swing for purposes of optimizing the transmission behavior.

12. Device according to claim 11,'
characterized in that
the frequency swing is optimized (13) toward a maximal range on the basis of the table (12) when the evaluation unit (6) detects a low field intensity and a low error rate at the same time.

13. Device according to one of the claims 9 through 12,
characterized in that
the evaluation unit (6) contains a second table (14) reproducing the obtainable interference immunity of the transmission (15) dependent on the adjusted frequency swing for purposes of optimizing the transmission behavior.

14. Device according to claim 13,
characterized in that

the frequency swing is optimized (13) toward a maximal interference immunity on the basis of the secon [sic] table (14) when the evaluation unit (6) detects a high field intensity and a high error rate at the same time.

15. Device according to one of the claims 9 through 14,
characterized in that
the optimal frequency swing is selected lower for a maximal range than the frequency swing for a maximal interference immunity.

16. Device according to one of the claims 9 through 15,
characterized in that
it is designed for a transmission (15) according to the DECT standard.

Abstract

Method and device for wireless data transmission according to an FSK method, especially a GFSK method

According to the present invention, a mobile radio device is provided for wirelessly transmitting data according to a GFSK method, as performed, for example, with DECT devices. The device comprises a receiver (6), a first measuring device (6) for the error rate of received data and a second measuring device (3) for the field intensity (8) during the reception of data. An evaluation unit (6) processes the measured error rate and the measured field intensity. Depending on the measured error rate and the measured field intensity, a control unit (13) adjusts the frequency swing of the GFSK method, which is utilized for wirelessly transmitting (15) the data by a transmitter (5) in the mobile radio device (16), for purposes of optimizing the transmission behavior. In order to optimize the transmission behavior, the evaluation unit (6) contains a first table (12) and a second table (14) reproducing the obtainable range or, respectively, the obtainable interference immunity of the transmission (15) dependent on the selected frequency swing.

Figure 1

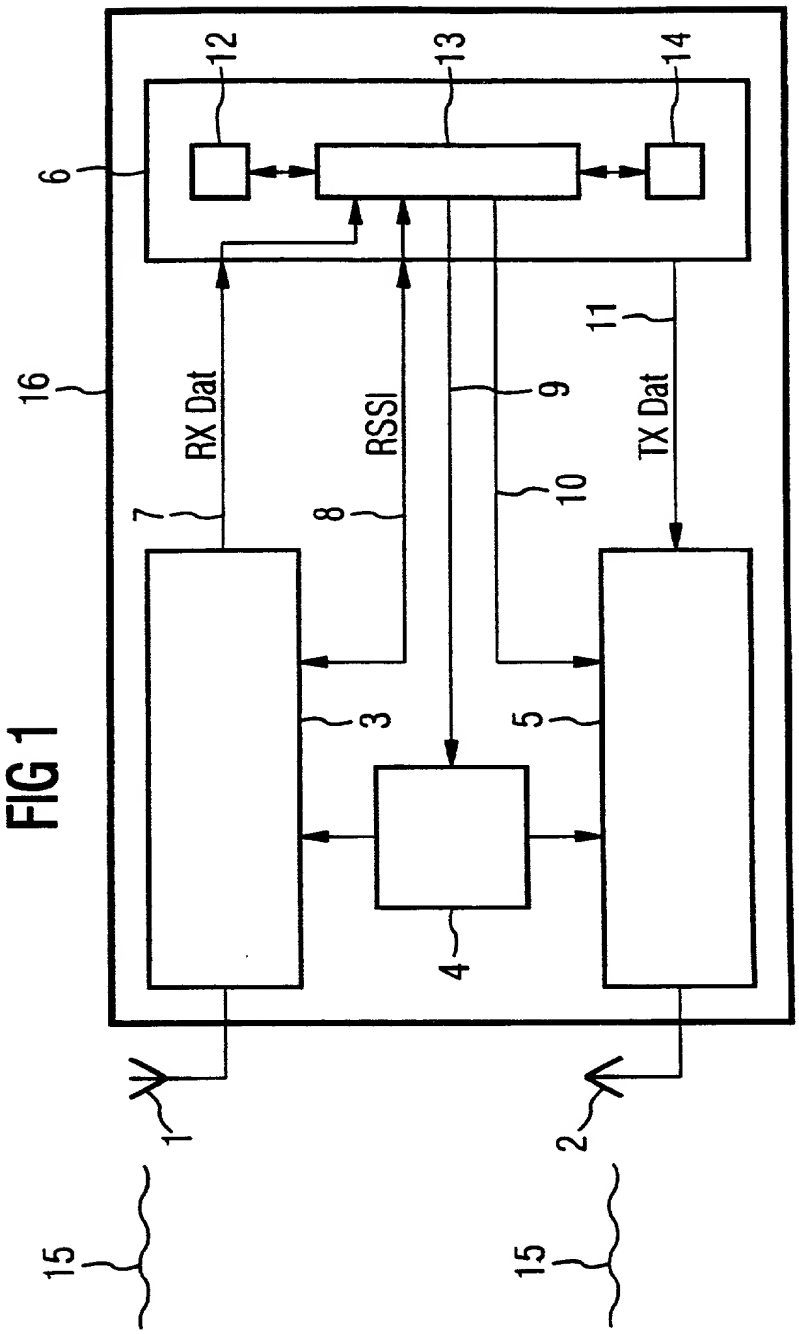
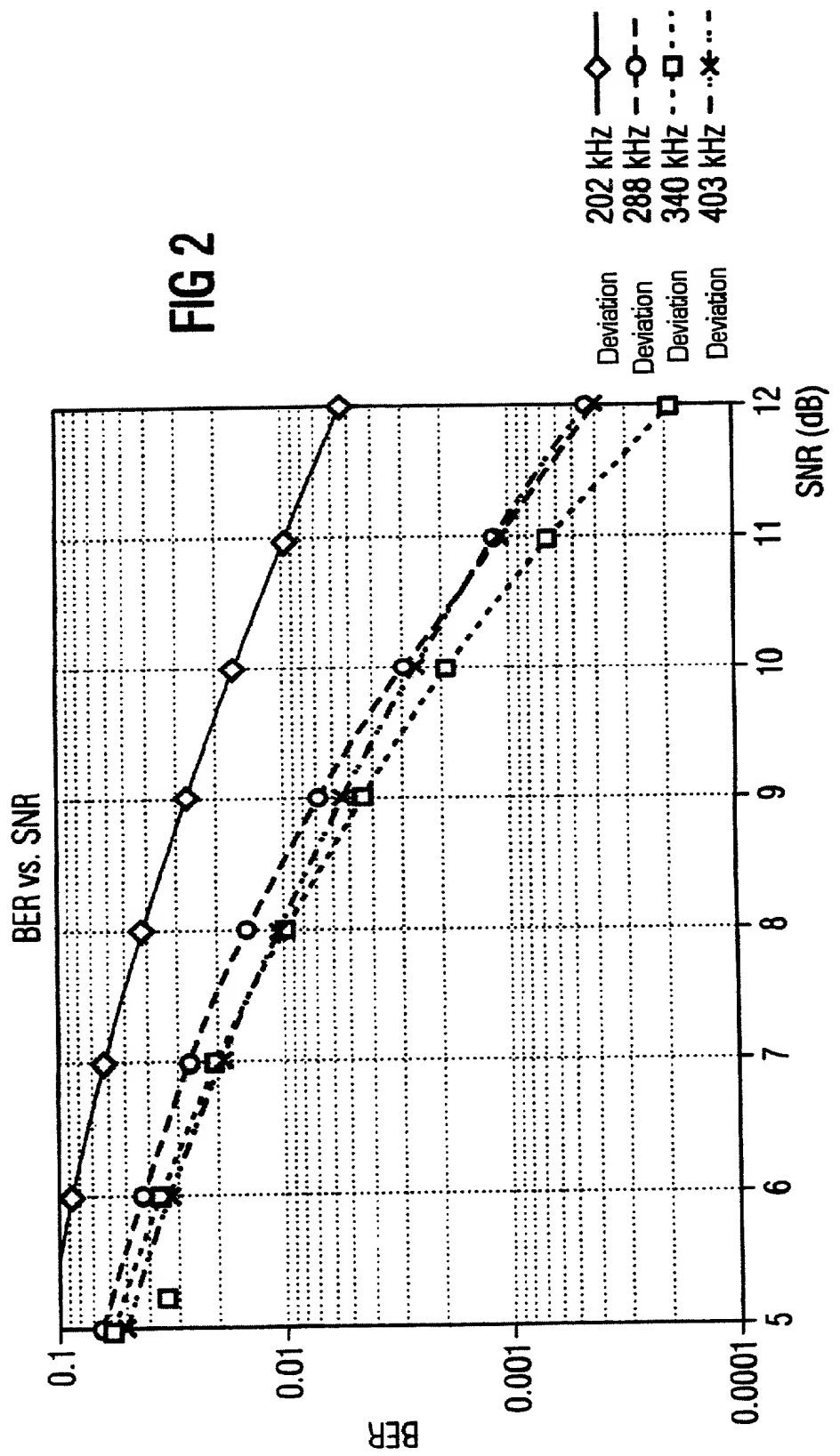


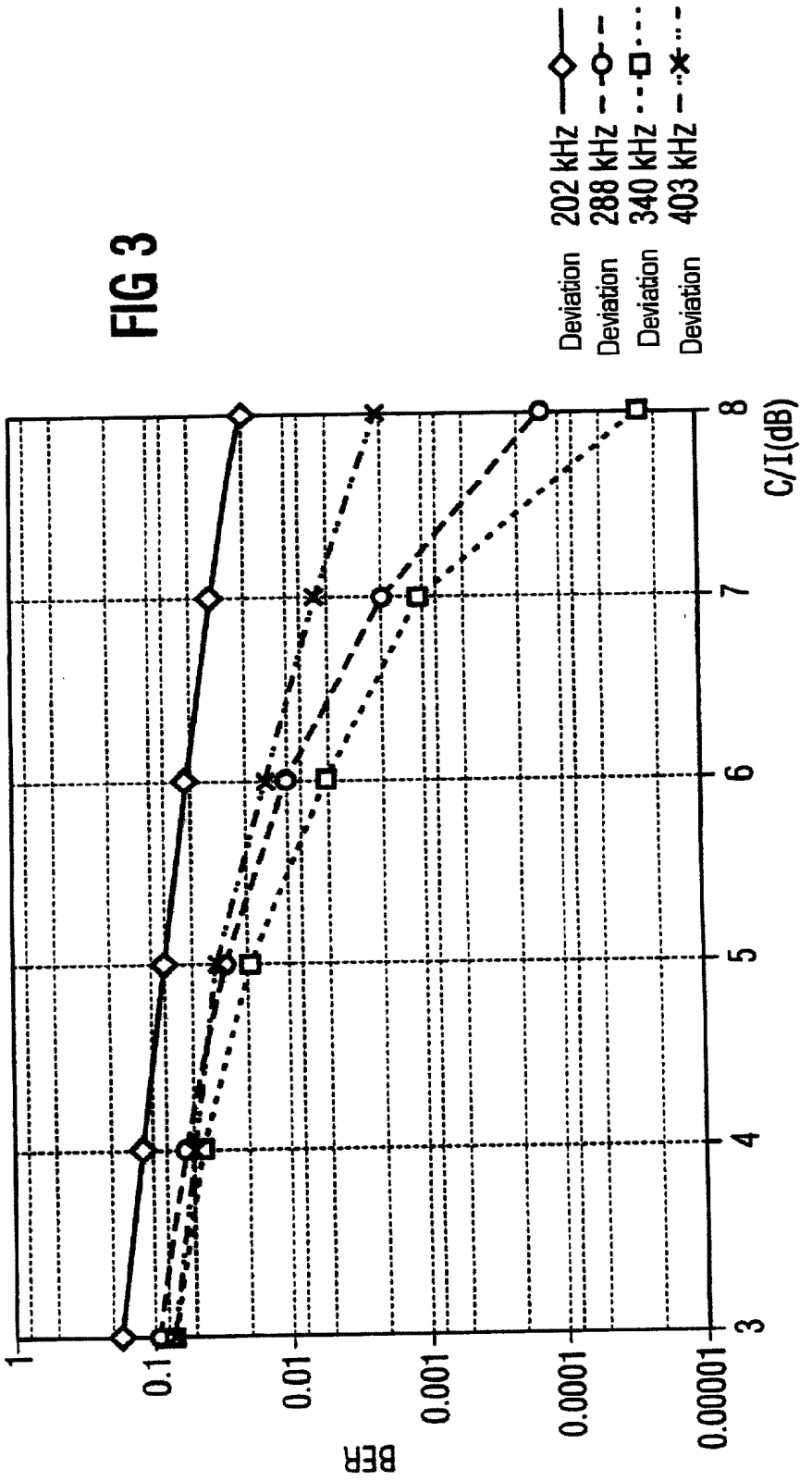
FIG 1

FIG 2



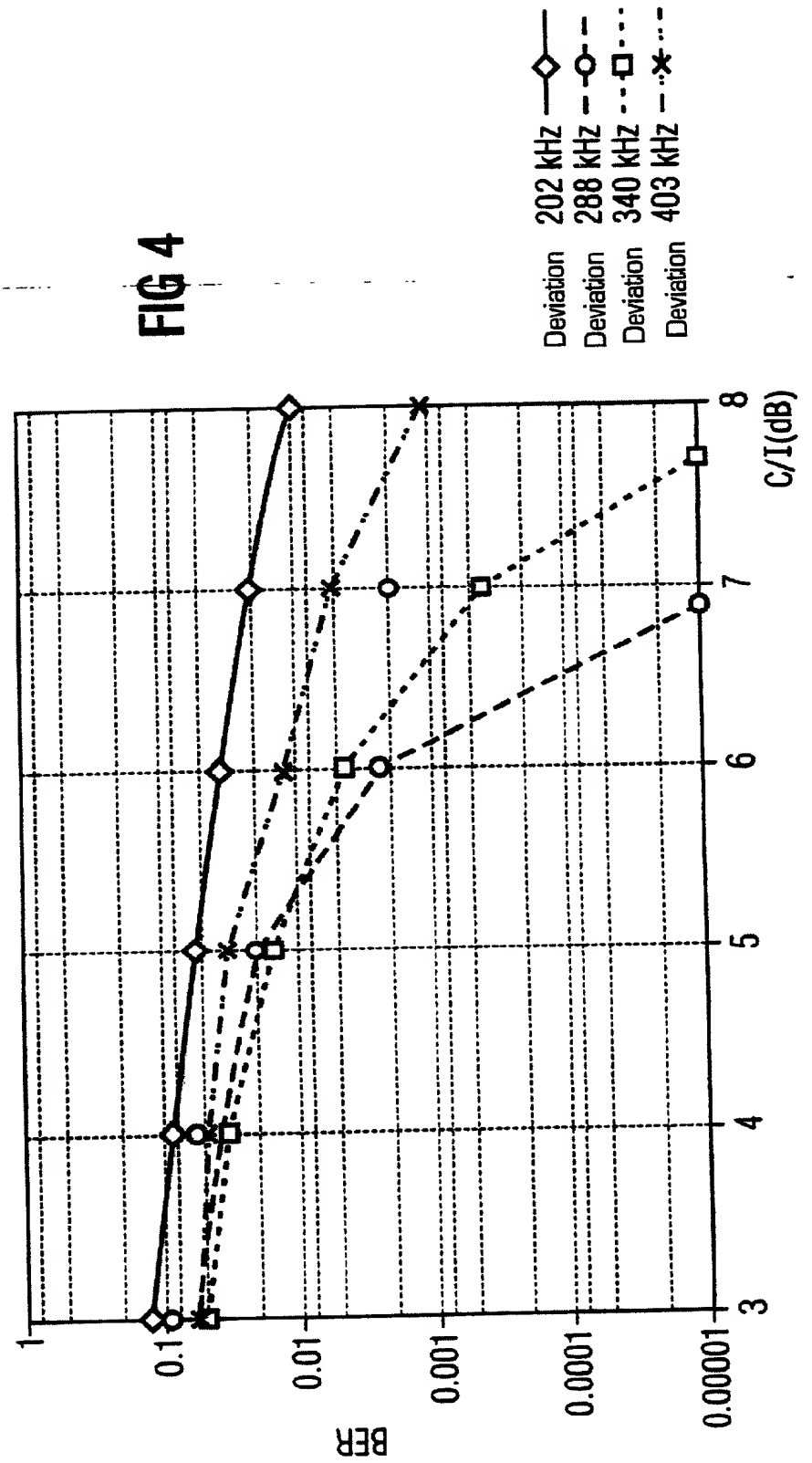
Bit error rate dependent on the signal-to-noise ratio

FIG 3



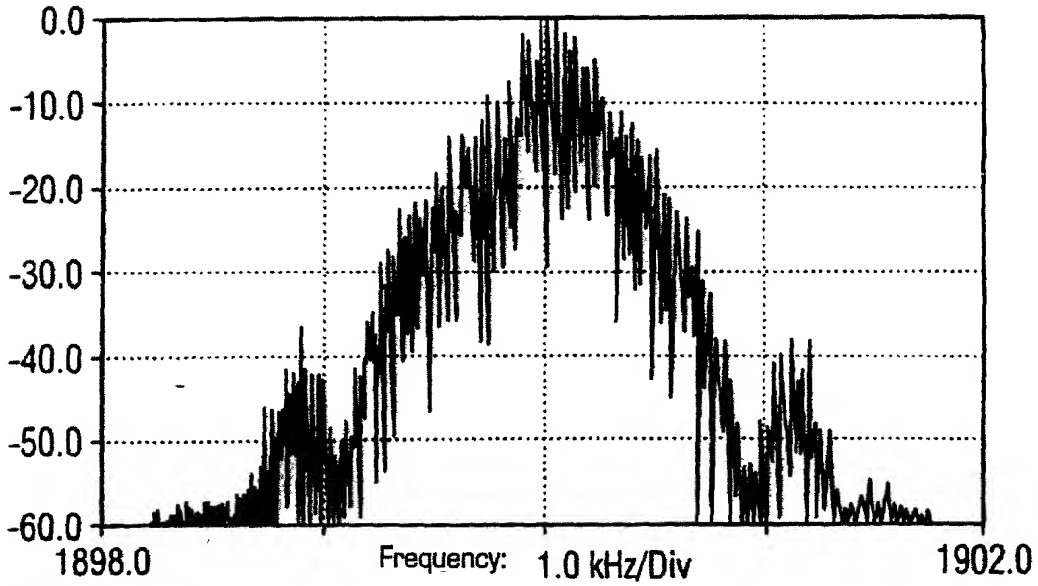
Bit error rate dependent on the signal-to-noise ratio
[Boost of the noise signal: 340 kHz]

FIG 4



Bit error rate dependent on the signal-to-noise ratio
(Boost of the noise signal: 288 kHz)

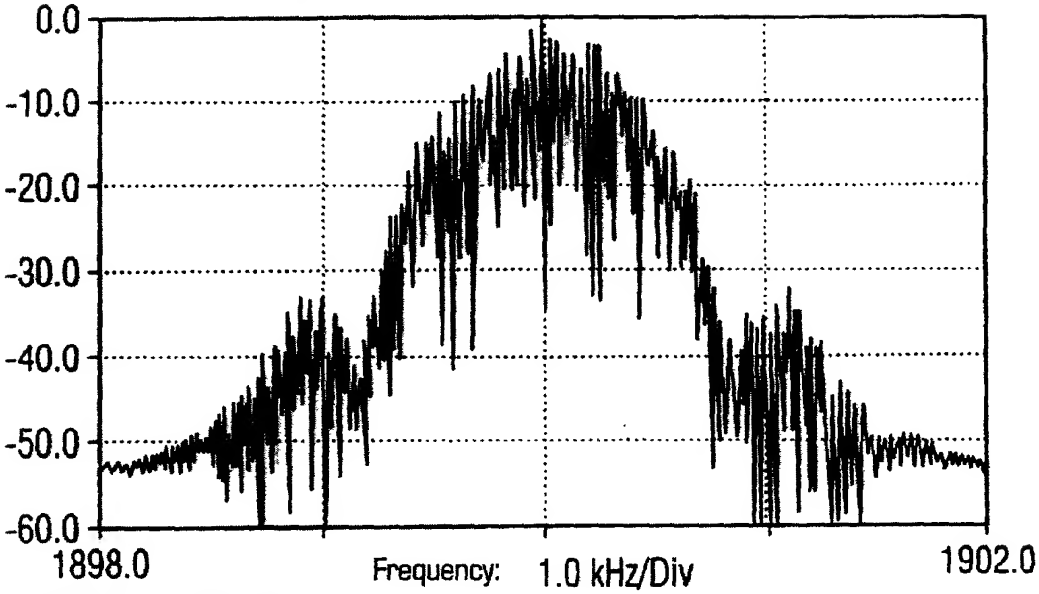
FIG 5A



Deviation: 202 kHz

Spectrum of a GFSK signal (202 kHz boost)

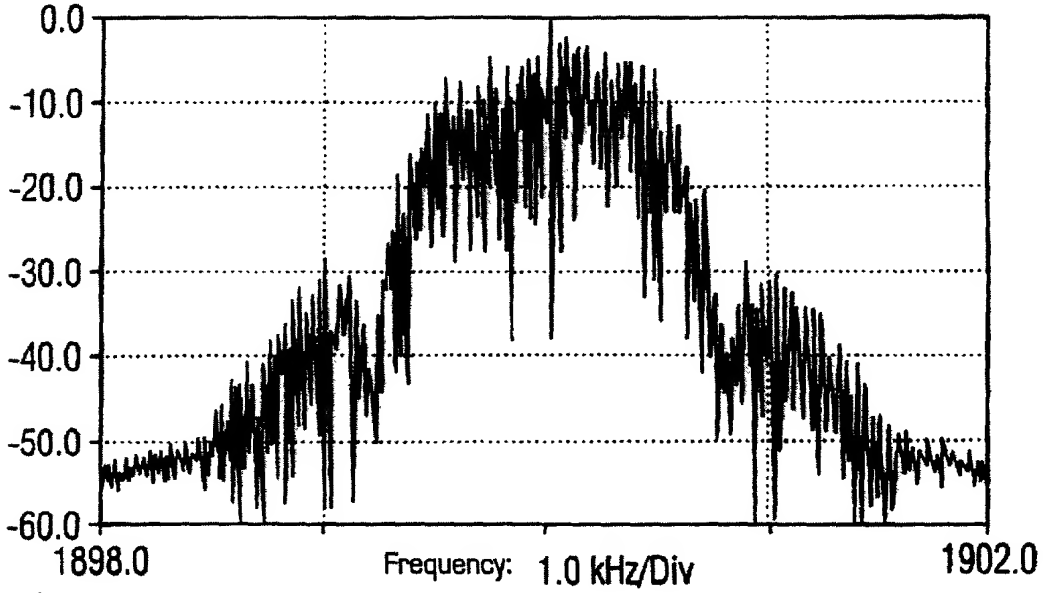
FIG 5B



Deviation 288 kHz

Spectrum of a GFSK signal (288 kHz boost)

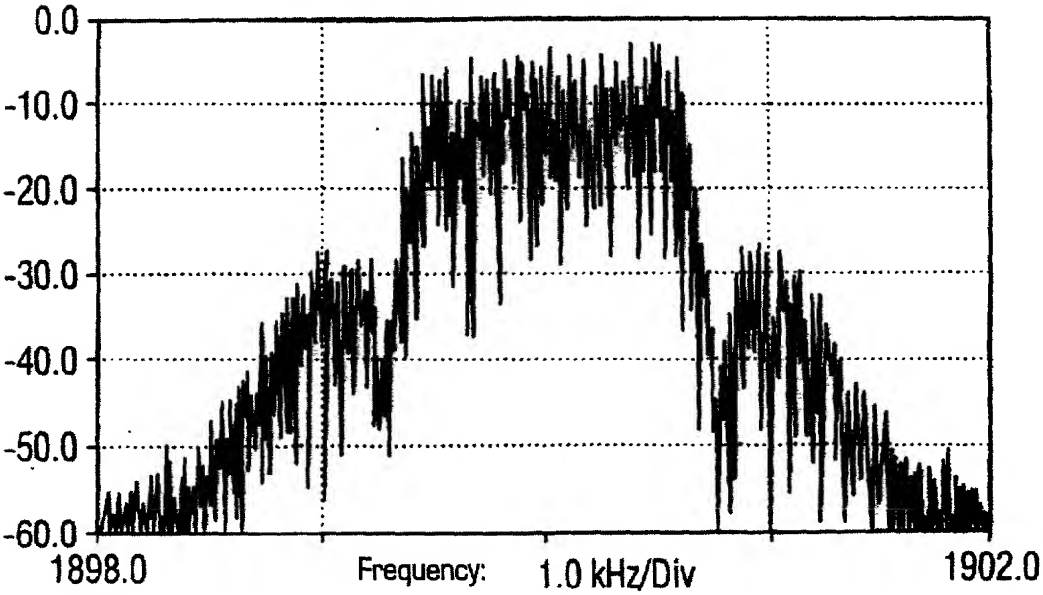
FIG 5C



Deviation: 340 kHz

Spectrum of a GFSK signal (340 kHz signal boost)

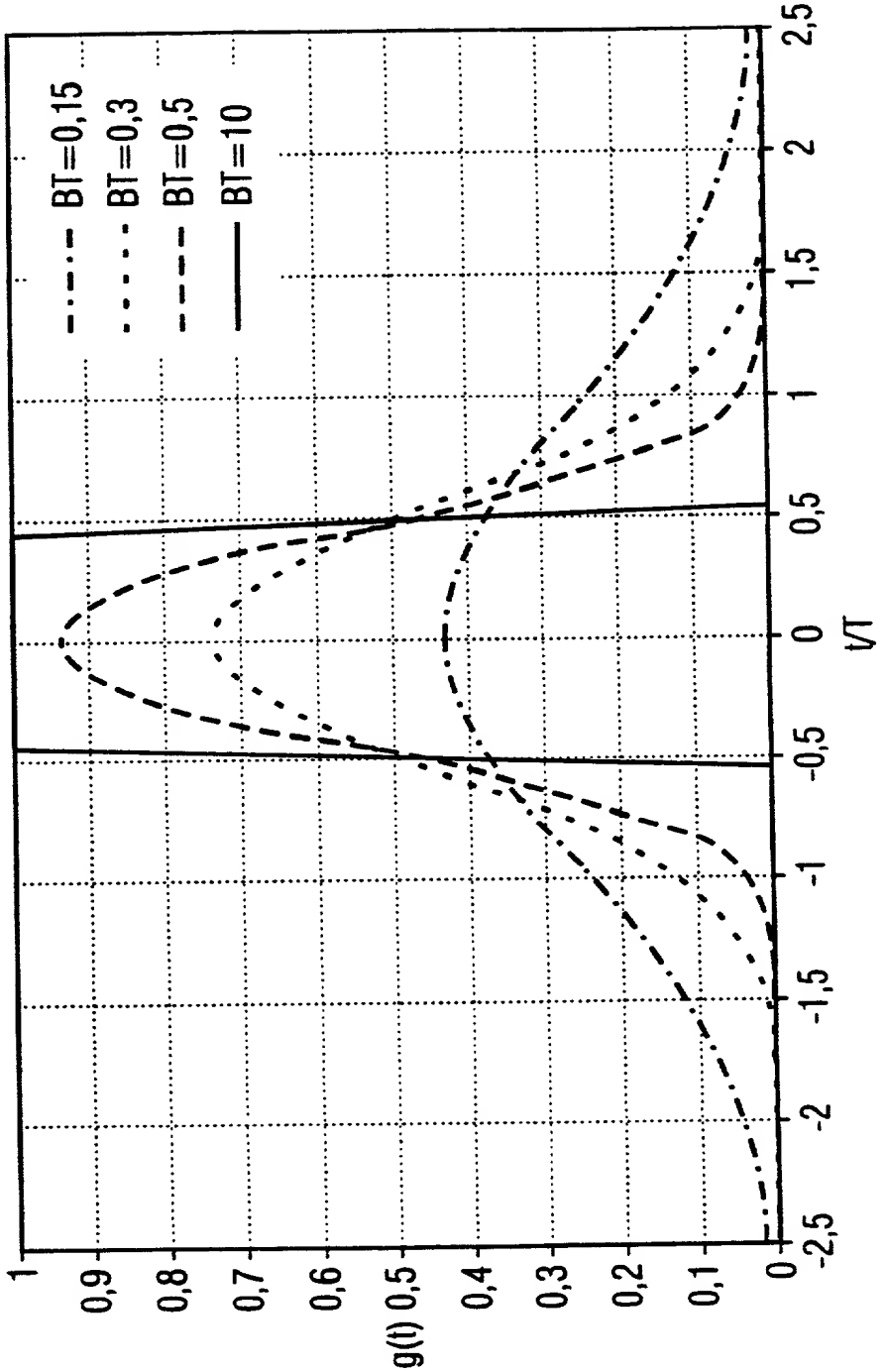
FIG 5D



Deviation: 403 kHz

Spectrum of a GFSK signal (403 kHz boost)

FIG 6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BT=0,3
BT=0,5
BT=10
g(t)
t/T
1
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
2,5
2
1,5
1
0,5
0
-0,5
-1
-1,5
-2
-2,5

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APPLICANT(S):	HENRIK WAGENER
ATTORNEY DOCKET NO.:	P00,1879
INTERNATIONAL APPLICATION NO:	PCT/DE99/01721
INTERNATIONAL FILING DATE:	11 JUNE 1999
INVENTION:	METHOD AND DEVICE FOR WIRELESS DATA TRANSMISSION OF DATA ACCORDING TO AN FSK METHOD, ESPECIALLY A GFSK METHOD

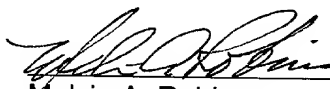
Assistant Commissioner for Patents,
Washington D.C. 20231

APPOINTMENT OF ASSOCIATE POWER OF ATTORNEY

Dear Sir:

I am an attorney designated on the Power of Attorney for the above-referenced application. I hereby appoint Mark Bergner (Reg. No. 45,877) as an associate attorney, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

Submitted by,



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German Language Declaration

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POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

And I hereby appoint

Messrs. John D. Simpson (Registration No. 19,842) Lewis T. Steadman (17,074), William C. Stueber (16,453), P. Phillips Connor (19,259), Dennis A. Gross (24,410), Marvin Moody (16,549), Steven H. Noll (28,982), Brett A. Valiquet (27,841), Thomas I. Ross (29,275), Kevin W. Guynn (29,927), Edward A. Lehmann (22,312), James D. Hobart (24,149), Robert M. Barrett (30,142), James Van Santen (16,584), J. Arthur Gross (13,615), Richard J. Schwarz (13,472) and Melvin A. Robinson (31,870), David R. Metzger (32,919), John R. Garrett (27,888) all members of the firm of Hill, Steadman & Simpson, A Professional Corporation.

19 & Cont

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Unterschrift des Erfinders — Datum 8. Juni 99	Inventor's signature — Date
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Staatsangehörigkeit Bundesrepublik Deutschland	Citizenship
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Voller Name des zweiten Miterfinders (falls zutreffend):	Full name of second joint inventor, if any:
Unterschrift des Erfinders — Datum	Second Inventor's signature — Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

Declaration and Power of Attorney For Patent Application
Erklärung Für Patentanmeldungen Mit Vollmacht
German Language Declaration

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dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

My residence, post office address and citizenship are as stated below next to my name,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Verfahren und Gerät zur drahtlosen Übertragung von Daten gemäß einem FSK-Verfahren, insbesondere einem GFSK-Verfahren

deren Beschreibung

(zutreffendes ankreuzen)

☒ hier beigefügt ist.

☐ am _____ als PCT internationale Anmeldung PCT Anmeldungsnummer _____ eingereicht wurde und am _____ abgeändert wurde (falls tatsächlich abgeändert).

the specification of which

(check one)

☐ is attached hereto.

☐ was filed on _____ as PCT international application PCT Application No. _____ and was amended on _____ (if applicable)

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Anspruche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die fur die Prufung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird

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German Language Declaration

Prior foreign appplications
Priorität beansprucht

			Priority Claimed	
198 27 028.3	Germany	17. Juni 1998	☒	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			☐	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			☐	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35. United States Code. §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occured between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)
(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgeben)	(Status) (patented, pending, abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CHANGE OF ADDRESS OF APPLICANTS' REPRESENTATIVE

APPLICANT(S):	HENRIK WAGENER
ATTORNEY DOCKET NO.:	P00,1879
INTERNATIONAL APPLICATION NO:	PCT/DE99/01721
INTERNATIONAL FILING DATE:	11 JUNE 1999
INVENTION:	METHOD AND DEVICE FOR WIRELESS DATA TRANSMISSION OF DATA ACCORDING TO AN FSK METHOD, ESPECIALLY A GFSK METHOD

Assistant Commissioner for Patents,
Washington D.C. 20231

S I R:

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